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Agents of urinary tract infections

Urinary tract infections (UTIs)

- **Frequency of UTIs:**
- The 2nd most common infections (after respiratory ones)
- In adults: the most common infections
- Afflicting mainly females (because of shorter urethra)



Examples of UTIs I

- The most common UTI:
- <u>Cystitis</u> develops ascendently caused by intestinal microflora
 - Symptoms:
 - dysuria (difficult urination with sharp and burning pain)
 - pollakisuria (urgent need to urinate accompanied by urination of a small amount of urine only)

Examples of UTIs II

Other UTIs:

mainly <u>pyelonephritis</u> (more serious) origin: ascendent or hematogenous

Symptoms:

fever, chills, flank pain, or costovertebral tenderness, urinary frequency, dysuria, hematuria

urethritis – will be dealt with STD

Etiology of UTIs

Proportional representation of microbes differs in:

- non-complicated UTIs
- infections accompanying structural abnormalities (prostatic hypertrophia, urinary stones, strictures, pregnancy, congenital defects, permanent catheters)
- infections accompanying functional disorders (vesicoureteral reflux, neurological disorders, diabetes mellitus)

Etiology of non-complicated UTIs

- 80 % Escherichia coli
- 10 % enterococci (Enterococcus faecalis)
- 5 % Proteus mirabilis

other enterobacteria (Klebsiella pneumoniae, Kl. oxytoca, Ent. cloacae, C. freundii etc.) Streptococcus agalactiae coagulase neg. staphylococci (S. epidermidis, S. saprophyticus, S. haemolyticus etc.) yeasts (mainly Candida albicans)



www.medmicro.info

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Etiology of complicated UTIs

circa 80 %: Escherichia coli Klebsiella pneumoniae Proteus mirabilis Pseudomonas aeruginosa enterococci other enterobacteria acinetobacters other G-neg. non-fermenting rods

candidae

Lege artis taking a urine sample

- 1. Only after a thorough cleaning of genital incl. external orifficium of urethra by means of soap and water
- 2. Take the middle stream of urine only
- 3. Use a guaranteed sterile vessel
- 4. Pour it into a sterile tube & stopper promptly
- 5. If not possible to process it within 2 hours, place the specimen into 4 °C for 18 hours at most

COUNTERTHINK



http://www.naturalnews.com/cartoons/Expensive_Urine_600.jpg

Semi-quantitative examination of the urine sample – I

We are interested

- not only in the kind of microbe present in the urine sample, but especially
- in the amount of the microbe

Why are we interested in the number of microbes in 1 ml of urine?

Because

- high numbers only stand for the UTI
- low numbers mean usually contamination acquired during urination

Semi-quantitative examination of the urine sample – II

Therefore, the urine is inoculated on culture media by means of a calibrated loop, usually taking 1 µl of urine

In this case

1 colony means 10³ CFU/ml 10 colonies mean 10⁴ CFU/ml 100 colonies mean 10⁵ CFU/ml

(CFU = colony-forming unit = 1 cell

Significant concentrations of bacteria in urine

Type of specimen, symptoms	Type of microbe	Significant number (CFU/ml)
Middle stream, symptoms present	Primary urine pathogen	10 ³
	Dubious urine pathogen	10 ⁵
Middle stream, no symptoms	Any	10 ⁵
Suprapubic punction	Any	10 ¹

Therapy

- Trimethoprim-sulfamethoxazole
- Nitrofurantoin
- Cephalexin
- Fluorochinolones
- Amoxicillin-clavulanate
- in complicated UTIs ATB sensitivity assessment
- ESBL strains

Homework 3 – solution

Paulus Peeter Rubens (1577-1640): Goddess of health Hygiene (1615)



Homework 3 – detail

Paulus Peeter Rubens (1577-1640): Goddess of health Hygiene (1615)



Homework 4

Who painted this picture and what is its name?

